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Regional Disparities in Access to Maternal and Child Health Services in Indonesia: An Ecological Analysis of 34 Provinces

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Abstrak

Background: Geographical disparities, including those between rural and urban areas and between Java and non-Java regions, hinder the equitable distribution of maternal and child health services in Indonesia. Rural–urban tables by province from the 2023 Indonesian Health Survey (SKI) and the National Socioeconomic Survey (Susenas) are not yet publicly available; therefore, disparities were examined at the regional level. **Objective:** To describe interprovincial and interregional disparities in antenatal care, facility-based deliveries, postpartum care, and complete basic immunization (IDL), and to examine their association with the midwife-to-population ratio. **Methods:** A cross-sectional ecological study across 34 provinces. Indicators K1, K4, deliveries at health care facilities, and complete postpartum visits (KF) for 2022 were obtained from the 2022 Indonesia Health Profile; IDL for 2021 from routine immunization reports; and the midwife-to-population ratio for 2020 from the 2020 Health Profile. Analyses used the median and interquartile range (IQR), the Mann–Whitney, Kruskal–Wallis, and Wilcoxon tests, and Spearman's correlation with a 95% Fisher-z confidence interval (CI), along with sensitivity analyses excluding Papua and West Papua. **Results:** The median K1 was 85.5% (IQR 77.3–89.7), while the median K4 was only 63.8% (IQR 53.4–74.9); the difference between K1 and K4 had a median of 15.8 percentage points ($p < 0.001$). The median K4 in Java–Bali was 74.9%, and in Nusa Tenggara–Maluku–Papua, it was 42.7%. Provinces in the eastern region had lower K1, K4, facility-based deliveries, and complete KF scores ($p = 0.008$–0.044), but these differences were no longer statistically significant after excluding Papua and West Papua. Facility-based deliveries correlated with complete antenatal care ($\rho = 0.77$) and with IDL ($\rho = 0.62$). The midwife-to-population ratio showed a weak negative correlation with K4 ($\rho = -0.36$). Eleven provinces fell below the median for K4, facility-based deliveries, and IDL simultaneously. **Conclusion:** The largest disparities were observed in the completeness of antenatal visits and in the easternmost provinces. A rural–urban analysis by province requires microdata from the 2023 SKI or Susenas surveys.
Keywords: health disparities; antenatal care; facility-based deliveries; complete basic immunization; midwives; Indonesia

Introduction

High-quality maternal and child health services can only reduce mortality if they are accessible to all women and children, regardless of where they live. Studies on strategies to reduce maternal mortality emphasize that the presence of skilled personnel during childbirth, referral support for obstetric complications, and key interventions during pregnancy must be available as a mutually supportive continuum (Campbell & Graham, 2006). The Lancet series on midwifery confirms that midwifery services

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integrated into the health system are associated with better health outcomes for mothers and newborns, but these benefits are only realized when service coverage reaches the hardest-to-reach populations (Renfrew et al., 2014; ten Hoope-Bender et al., 2014).

Indonesia is an archipelago with significant regional variations in geography, population density, and facility capacity. These differences are evident in survey data: an analysis of the 2017 Indonesia Demographic and Health Survey (IDHS) found that urban women were 1,255 times more likely to have four or more antenatal visits compared to rural women after adjusting for age, education, parity, and wealth (Wulandari et al., 2021). This finding indicates that place of residence remains linked to access, but a single national figure does not reveal in which provinces these disparities are concentrated.

Program outcomes are also uneven. According to the 2022 Indonesia Health Profile, the national coverage rate for the fourth antenatal visit (K4) is 70.9%, while the rate of deliveries at health care facilities is 87.9% (Ministry of Health of the Republic of Indonesia, 2023). The 2023 SKI reported a K4 rate of 68.1% and a K6 rate of only 17.6%, while the rate of complete basic immunization among children aged 12–23 months stood at just 35.8% (Health Development Policy Agency [BKPK], 2024). These national figures mask wide interprovincial variations, and it remains unclear whether these disparities follow regional patterns, distances between levels of care, or the availability of midwives.

The rural–urban divide is a common perspective, but rural–urban tables by province for maternal and child indicators from the 2023 SKI and Susenas are not publicly available as aggregate data. The authors could not find them in accessible Ministry of Health publications. This article therefore uses available provincial aggregate data to describe regional disparities and draws on rural–urban evidence from the literature as a backdrop. The objectives of this study are (1) to describe the interprovincial distribution of indicators K1, K4, facility-based deliveries, complete KF, and IDL; (2) to compare regions, particularly Java–Bali with areas outside Java and the Nusa Tenggara–Maluku–Papua group with other provinces; (3) to assess the difference between the first and fourth visits; and (4) to examine the association between these indicators and the midwife-to-population ratio. This study fills a gap by providing a comprehensive interprovincial overview that can be used to determine regional priorities before more detailed village–city data becomes available.

Methods

Design and unit of analysis. This study is a cross-sectional ecological study with 34 provinces as the unit of analysis. Because the unit of analysis is the province, the results describe interregional differences and cannot be interpreted as relationships at the individual level or as rural–urban differences.

Data Sources. All data are secondary, open-access, and downloadable. The 2022 indicators K1, K4, deliveries at health care facilities, and the complete KF by province were obtained from Appendix 24 of the 2022 Indonesia Health Profile (Ministry of Health of the Republic of Indonesia, 2023). The 2021 infant IDL coverage by province was

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taken from routine immunization program reports as published by Databoks (Kusnandar, 2022). The ratio of midwives per 100,000 population in 2020 was taken from the 2020 Indonesia Health Profile (Ministry of Health of the Republic of Indonesia, 2021); this data is available for 32 provinces because Papua and West Papua were not included in the list used. The 2023 national SKI figure is taken from the publication of key results (BKPK, 2024) and is used only for comparison purposes. A summary of the sources is presented in Table 1.

Table 1. Research data sources

Indicator	Year	Source	Unit
K1 (first antenatal visit)	2022	Indonesia Health Profile 2022, Appendix 24	% of pregnant women reached
K4 (fourth antenatal visit)	2022	Indonesia Health Profile 2022, Appendix 24	% of pregnant women reached
Deliveries at health care facilities	2022	Indonesia Health Profile 2022, Appendix 24	% of target population of women in labor
Complete postpartum care (complete postpartum visits)	2022	Indonesia Health Profile 2022, Appendix 24	% of target postpartum mothers
Infant IDL	2021	Routine Immunization Report (Kusnandar, 2022)	% of infants
Midwife-to-population ratio	2020	Indonesia Health Profile 2020	per 100,000 population

Operational definitions. K1 is the percentage of pregnant women who received their first antenatal care visit; K4 is the percentage of pregnant women who received four antenatal care visits in accordance with standards; complete KF is the percentage of postpartum women who received all postpartum care visits. The K1–K4 difference is calculated as K1 minus K4 in percentage points and is used as a measure of antenatal care dropout. Administrative coverage rates are calculated based on projected targets and may therefore differ from survey figures (Cutts et al., 2013).

Regional grouping. The provinces are divided into five regions: Java–Bali (DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, Bali; n = 7), Sumatra (n = 10), Kalimantan (n = 5), Sulawesi (n = 6, including Gorontalo and West Sulawesi), and Nusa Tenggara–Maluku–Papua (West Nusa Tenggara, East Nusa Tenggara, Maluku, North Maluku, West Papua, Papua; n = 6). Two comparisons were defined prior to analysis: Java–Bali versus other provinces and Nusa Tenggara–Maluku–Papua versus other provinces.

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Statistical analysis. Data were described using the median and interquartile range (IQR) because the distribution across provinces was not assumed to be normal. Comparisons between two groups used the Mann–Whitney test, comparisons among five regions used the Kruskal–Wallis test, and comparisons between K1 and K4 within the same province used the signed-rank Wilcoxon test. Correlations among indicators and with the midwife-to-population ratio were assessed using Spearman's rank correlation (ρ), with 95% confidence intervals (CI) based on Fisher's z-transformation and the Bonett–Wright standard error, calculated as the square root of $(1 + \rho^2/2)/(n - 3)$. The significance level was set at a two-sided $p < 0.05$. A sensitivity analysis was conducted by repeating the regional comparisons excluding Papua and West Papua, the two provinces with the most extreme values. The analysis was performed using Python 3 and the SciPy library.

Design limitations. With 34 provinces, statistical power is limited. Inter-regional comparisons and correlations are exploratory and not corrected for multiple testing. The years of the indicators are not uniform (2020–2022), and the 2021 IDL routine figures were not directly compared with the 2023 SKI figures, which use different denominators and guidelines.

Results

Interprovincial distribution. The 2022 national figures for K1, K4, facility-based deliveries, and complete KF were 86.2%, 70.9%, 87.9%, and 80.9%, respectively (Ministry of Health of the Republic of Indonesia, 2023). At the provincial level, coverage varied widely (Table 2). K4 ranged from 18.1% (Papua) to 84.6% (Banten), while facility-based deliveries ranged from 44.9% (Papua) to 96.4% (South Sulawesi). Eleven provinces achieved a facility-based delivery rate of ≥ 90%, while 10 provinces were below 80%. Fourteen provinces had a K4 rate below 60%.

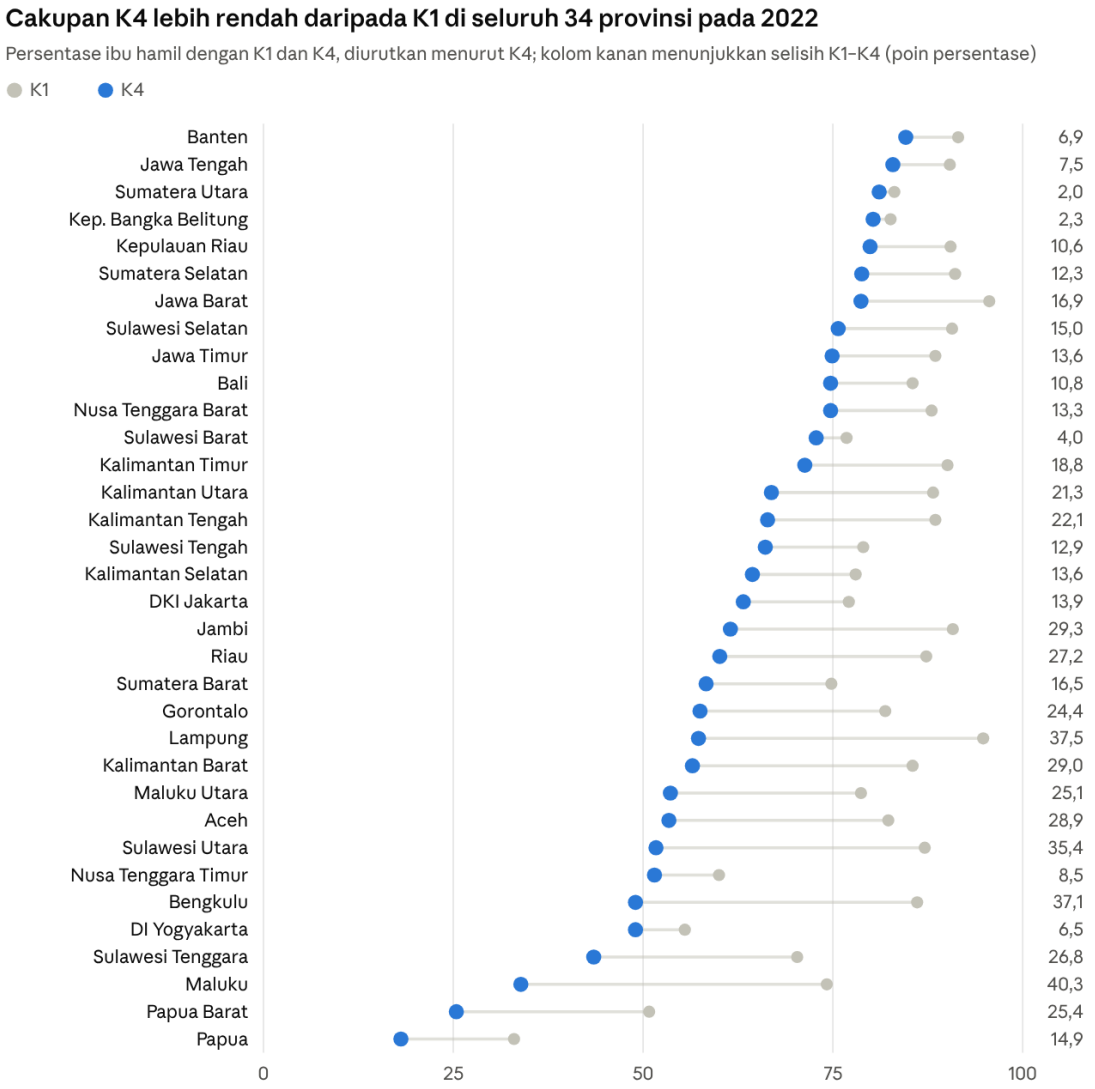
Table 2. Descriptive statistics of service indicators by province

Indicator	Median	IQR	Minimum	Maximum
Q1 2022 (%)	85.5	77.3–89.7	33.0 (Papua)	95.6 (West Java)
K4 2022 (%)	63.8	53.4–74.9	18.1 (Papua)	84.6 (Banten)
Deliveries in health facilities 2022 (%)	85.6	78.8–92.1	44.9 (Papua)	96.4 (South Sulawesi)
Complete family planning coverage in 2022 (%)	83.8	70.7–88.2	22.9 (West Papua)	95.3 (West Java)
2021 Infant IDL (%)	84.2	73.6–89.9	42.7 (Aceh)	100.0 (South Sulawesi)

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Indicator	Median	IQR	Minimum	Maximum
Difference between K1 and K4 (percentage points)	15.8	11.2–26.4	2.0 (North Sumatra)	40.3 (Maluku)

Difference in antenatal visits. K4 was lower than K1 in all 34 provinces (Figure 1), with a median difference of 15.8 percentage points (Wilcoxon, $p < 0.001$). The largest differences were found in Maluku (40.3), Lampung (37.5), Bengkulu (37.1), North Sulawesi (35.4), and Jambi (29.3), while the smallest were found in North Sumatra (2.0), the Bangka Belitung Islands (2.3), and West Sulawesi (4.0). The difference in facility-based deliveries versus complete postpartum care was also statistically significant (Wilcoxon, $p = 0.001$), indicating that facility-based deliveries do not automatically result in complete postpartum care.



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Figure 1. K4 coverage was lower than K1 coverage across all 34 provinces in 2022. Source: Indonesia Health Profile 2022, Appendix 24 (Ministry of Health of the Republic of Indonesia, 2023)

Regional differences. Median coverage by region is presented in Table 3. Java–Bali had a median K4 of 74.9% and a facility-based delivery rate of 92.3%, while Nusa Tenggara–Maluku–Papua had a median K4 of 42.7% and a facility-based delivery rate of 66.1%.

Table 3. Median service coverage by region (%)

Region	n	K1	K4	Deliveries at facilities	Full KF	IDL
Java–Bali	7	88.5	74.9	92.3	86.4	90.3
Sumatra	10	86.7	60.8	85.6	83.6	83.8
Kalimantan	5	88.2	66.4	81.0	84.1	80.2
Sulawesi	6	80.4	61.8	88.0	83.3	85.6
Nusa Tenggara–Maluku–Papua	6	67.1	42.7	66.1	62.6	73.3

The Nusa Tenggara–Maluku–Papua group had lower values than other provinces for K1 ($p = 0.008$), K4 ($p = 0.010$), facility-based deliveries ($p = 0.009$), and complete KF ($p = 0.044$), but the difference was not statistically significant for IDL ($p = 0.109$). The Java–Bali group did not differ significantly from other provinces in K1 ($p = 0.307$), K4 ($p = 0.055$), facility-based deliveries ($p = 0.225$), and complete KF ($p = 0.523$), but the difference in K1–K4 in Java–Bali (median 10.8) was smaller than that of other provinces ($p = 0.031$). The Kruskal–Wallis test for the five regions yielded $p = 0.057$ for K1, 0.058 for K4, 0.104 for facility-based deliveries, and 0.312 for complete KF.

Sensitivity analysis. After excluding Papua and West Papua, the differences between Nusa Tenggara–Maluku–Papua (now four provinces) and other provinces were no longer statistically significant for K4 ($p = 0.098$), facility-based deliveries ($p = 0.082$), and complete KF ($p = 0.347$). Interregional differences in these data are therefore heavily influenced by the two easternmost provinces.

Correlations among indicators. Facility-based deliveries were positively correlated with the complete KF ($\rho = 0.77$; 95% CI 0.56–0.89) and with K4 ($\rho = 0.65$; 95% CI 0.38–0.82). K1 is correlated with K4 ($\rho = 0.66$; 95% CI 0.38–0.83). The 2021 IDL correlated with facility-based deliveries ($\rho = 0.62$; 95% CI 0.33–0.81), the complete KF ($\rho = 0.64$; 95% CI 0.35–0.82), K1 ($\rho = 0.53$; $p = 0.001$), and K4 ($\rho = 0.43$; $p = 0.011$). Eleven provinces fell below the median for K4, facility-based deliveries, and IDL simultaneously: Aceh, West Sumatra, Riau, DKI Jakarta, East Nusa Tenggara, West Kalimantan, Southeast Sulawesi, Maluku, North Maluku, West Papua, and Papua. Nine provinces were above or at the median for all three indicators: South Sumatra, West

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Java, Central Java, East Java, Banten, Bali, West Nusa Tenggara, East Kalimantan, and South Sulawesi.

Midwife-to-population ratio. In the 32 provinces with data on the midwife-to-population ratio, this ratio showed a weak negative correlation with K4 (ρ = −0.36; 95% CI −0.64 to 0.00; p = 0.043) and was not statistically significant for K1 (ρ = −0.30; p = 0.092), facility-based deliveries (ρ = −0.22; p = 0.237), or complete KF (ρ = −0.11; p = 0.538). Since Papua and West Papua were not included in the midwife-to-birth ratio data, these results are the same as those from an analysis excluding those two provinces.

Discussion

The greatest disparity lies in the completeness of care, not in the first contact. The median K1 rate of 85.5% is significantly higher than the median K4 rate of 63.8%, and this decline is observed across all provinces. The same pattern is evident at the national level, where the K1 rate was 86.7% and the K4 rate was 68.1% in the 2023 SKI, while the K6 rate was only 17.6% (BKPK, 2024). The strategic framework for reducing maternal mortality positions antenatal care as part of a continuum that is beneficial when completed in full and linked to skilled delivery and referral (Campbell & Graham, 2006). Thus, targets that focus solely on the first contact may overestimate access. Provinces such as Lampung, Bengkulu, North Sulawesi, and Maluku, with a K1–K4 gap exceeding 35 percentage points, require an investigation into the causes of interrupted care. Such an investigation would include factors such as delayed first visits, distance, cost, and record-keeping—which cannot be distinguished using these aggregate data.

Regional disparities are real but concentrated in the easternmost provinces. The Nusa Tenggara–Maluku–Papua group scored lower on four maternal health indicators (p = 0.008–0.044), but these differences disappeared after Papua and West Papua were excluded. West Nusa Tenggara, which is in the same group, actually had a 91.4% rate of facility-based deliveries. These results indicate that regional labels do not accurately describe all provinces within them, and priorities should be directed toward specific provinces—particularly Papua, West Papua, and Maluku—rather than the entire eastern region. These findings align with the 2017 SDKI analysis, which showed that rural women in Indonesia are less likely to have four or more antenatal visits (Wulandari et al., 2021), as the provinces with the lowest coverage are located in the eastern archipelago; however, this shared trend does not prove the role of place of residence. Nevertheless, this study did not include a rural–urban variable; therefore, the relationship between regional disparities and place of residence could not be tested and can only be considered a hypothesis.

Facility-based childbirth, postpartum care, and immunization are closely linked. The correlations between facility-based childbirth and complete KF (ρ = 0.77) and with IDL (ρ = 0.62) indicate that provinces with strong service systems at one stage tend to be strong at other stages as well. This pattern aligns with the view that midwifery services integrated into the health system are associated with better outcomes for mothers and newborns (Renfrew et al., 2014; ten Hoope-Bender et al., 2014). However, a statistically significant difference (p = 0.001) in the proportion of births occurring in

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facilities compared to those with a complete KF indicates that continuity of care after childbirth is not yet guaranteed. The 2023 SKI reinforces this finding: postpartum care was reported for only 26.8% of women aged 10–54 years (BKPK, 2024), far lower than the routine rate of 80.9%. This discrepancy is likely related to definitions and denominators, as the routine figure is calculated against projected targets (Cutts et al., 2013); however, such a significant difference requires clarification before the routine figure is used as the sole basis for assessment.

The midwife-to-population ratio does not explain the gap. The weak negative correlation between the midwife-to-population ratio and K4 ($\rho = -0.36$) runs counter to expectations. One possible explanation—though not tested here—is that the per-capita ratio does not account for the distribution of midwives across vast, sparsely populated areas. Nor does the ratio measure competency, equipment availability, or referral systems. More detailed research needs to account for distance to facilities and the number of midwives in villages. The Lancet series on midwifery emphasizes that available personnel must work within a supportive system, including education, regulation, and referral systems (ten Hoope-Bender et al., 2014), so numbers alone are insufficient.

Implications. First, program targets should monitor complete K4 and KF coverage, not just K1 and facility-based deliveries. Second, the allocation of support should be directed toward provinces with low performance across multiple stages simultaneously—namely, the 11 provinces that fall below the median for K4, facility-based deliveries, and IDL. Third, the publication of rural–urban tables by province from the 2023 SKI and Susenas will allow for direct testing of rural–urban disparities. Evidence on the determinants of immunization in Indonesia indicates that immunization disparities are determined not only by the provider side but also by household characteristics (Herliana & Douiri, 2017); therefore, individual-level analysis is necessary to complement this ecological picture.

Limitations. First, the unit of analysis is the province, so there is a risk of ecological fallacy, and no village–city-level information is available. Second, routine coverage is calculated relative to projected targets and may exceed or differ from survey figures. Some values appear anomalous, such as in DI Yogyakarta, where K1 is 55.5% and facility-based deliveries are 59.5%, which likely reflect recording or denominator issues rather than genuinely low access. Third, the indicator years vary (2020–2022), and midwife-to-population ratios are unavailable for two provinces. Fourth, with 34 provinces and numerous tests without multiple testing correction, p-values should be interpreted as exploratory indicators.

Conclusion

The largest interprovincial disparities in maternal and child health services are evident in the completeness of antenatal visits: K4 is lower than K1 across all 34 provinces, with a median difference of 15.8 percentage points. Regional differences exist, particularly in Nusa Tenggara–Maluku–Papua, but these are heavily influenced by Papua and West Papua. Eleven provinces lag behind in K4, facility-based deliveries, and IDL simultaneously and should therefore be prioritized. The midwife-to-population ratio does

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not account for these disparities. Rural–urban disparities by province could not yet be assessed because aggregate data are not publicly available; analysis of microdata from the 2023 SKI and Susenas surveys is recommended as the next step.

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